

Patent Claims

1. Method for the manufacture of tubes (20) bent in a U-shape from a nonferrous metal, immediately following a tube-production line, having the consecutive steps of:

- a) uncoiling the drawn tube material (1) from a storage device (2),
- b) straightening the drawn tube material (1),
- c) annealing and subsequently cooling the drawn tube material (1) before or after cutting, for separation into tube portions (10), to the starting length for a tube (20) bent in a U-shape,
- d) bending the tube portions (10) into a U-shape.

2. Method for the manufacture of tubes bent in a U-shape according to claim 1, characterized in that the drawn tube material (1) or the tube portions (10) are subjected to quality control in one of steps a) to c).

3. Method for the manufacture of tubes bent in a U-shape according to claim 1 or 2, characterized in that the drawn tube material (1) is flushed with inert gas.

4. Method for the manufacture of tubes bent in a U-shape according to claim 3, characterized in that the inert gas flows counter to the direction in which the drawn tube material (1) is uncoiled.

5. Method for the manufacture of tubes bent in a U-shape according to any one of claims 2 to 4, characterized in that after cutting to length for separation into tube portions (10), defective tube portions are sorted out after the quality control.

6. Method for the manufacture of tubes bent in a U-shape according to any one of claims 1 to 5, characterized in

that, after cutting to length for separation, the tube portions (10) are subjected to internal and/or external cleaning.

7. Method for the manufacture of tubes bent in a U-shape according to any one of claims 1 to 6, characterized in that either the drawn tube material (1) is annealed in continuous operation or the separated tube portions (10) are annealed in batch operation.

8. Method for the manufacture of tubes bent in a U-shape according to any one of claims 1 to 7, characterized in that, after straightening and before testing, the drawn tube material (1) is subjected to a ribbing process.

9. Method for the manufacture of tubes bent in a U-shape according to any one of claims 1 to 4, characterized in that, when the drawn tube material (1) is annealed before cutting to length for separation into tube portions (10), the drawn tube material (1) is deposited on a basket winder and further processed on a single- or multiple-bending device (21).

10. Production line for the manufacture of tubes bent in a U-shape from a nonferrous metal, immediately following a tube-production line, comprising:

- a) a storage device having an uncoiling device (2) for drawn tube material (1),
- b) a straightening facility for the uncoiled drawn tube material (1) and testing facility (3),
- c) an annealing unit (4) and a following cooling unit (5) for the drawn tube material (1) before or after a cutting unit (11), for separation into tube portions, for cutting to the starting length or a multiple of the starting length for a tube (20) bent in a U-shape,

- d) a bending device (21) for bending the tube portions into a U-shape.

11. Production line for the manufacture of tubes bent in a U-shape according to claim 10, characterized in that, in order to flush the drawn tube material (1), an inert gas flushing unit (7) is arranged at one end of the tube and a suction apparatus (8) is arranged at the other end.

12. Production line for the manufacture of tubes bent in a U-shape according to claim 10 or 11, characterized in that the cutting unit (11) is followed by a sorting apparatus (12) for different lengths of the tube portions (10).

13. Production line for the manufacture of tubes bent in a U-shape according to claims 10 to 12, characterized in that a cleaning apparatus (13) is arranged downstream of the cutting unit (11) or optionally downstream of the sorting apparatus (12).

14. Production line for the manufacture of tubes bent in a U-shape according to claims 10 to 13, characterized in that the annealing unit (4) for the drawn tube material (1) in continuous operation or for the separated tube portions (10) in batch operation is an induction, radiation or convection furnace.

15. Production line for the manufacture of tubes bent in a U-shape according to claims 10 to 14, characterized in that the straightening facility (3) is followed by a ribbing apparatus (9) for the drawn tube material (1).

16. Use of the tubes (20) manufactured according to the method according to one of the Claims 1 to 9 and bent in a U-shape for heat exchangers.